

Supplementary Information

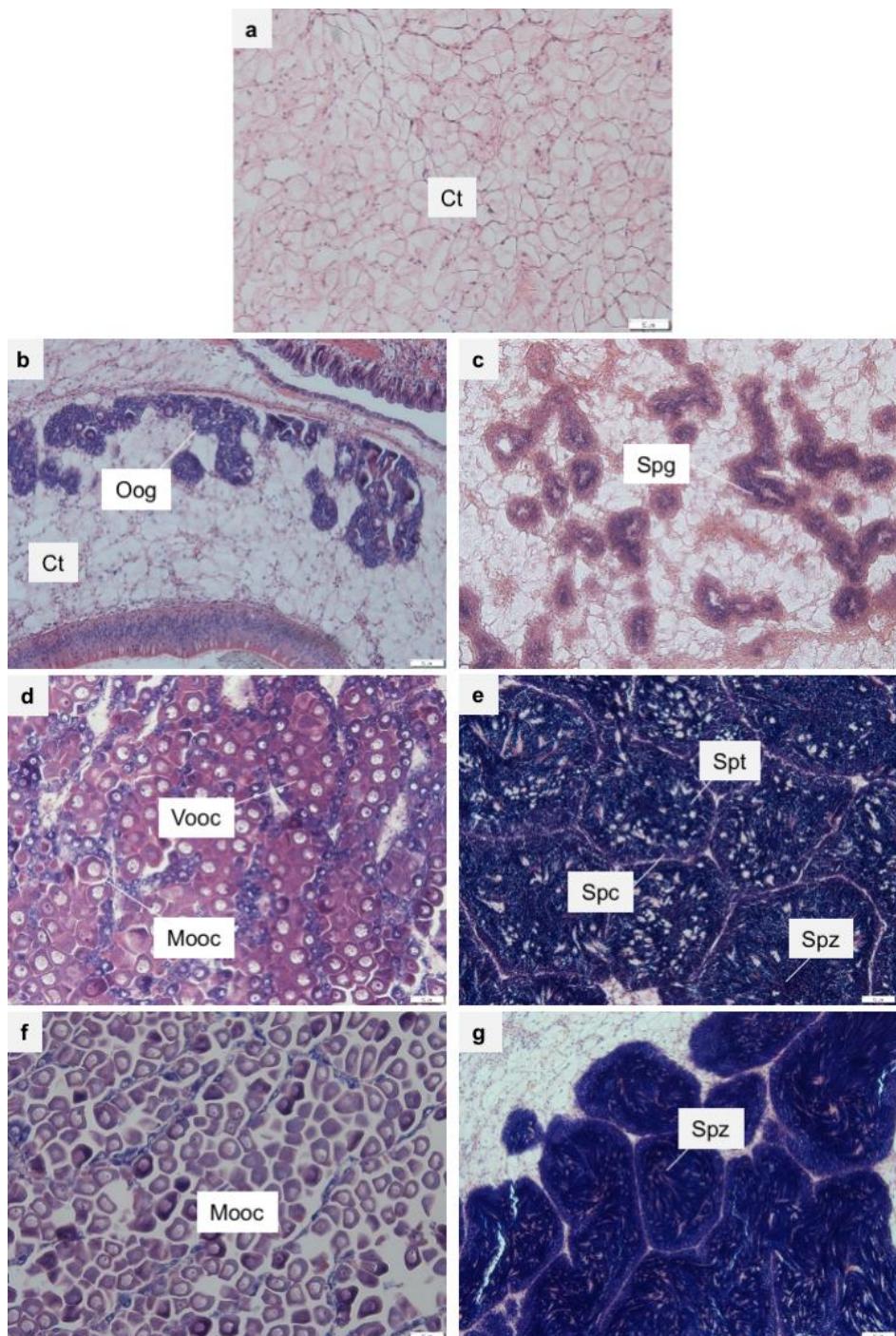
Oyster reproduction is compromised by acidification experienced seasonally in coastal regions

Myrina Boulais*, Kyle John Chenevert, Ashley Taylor Demey, Elizabeth S. Darrow, Madison Raine Robison, John Park Roberts, Aswani Volety.

University of North Carolina Wilmington, Center for Marine Science, 5600 Marvin K. Moss Lane, Wilmington, NC 28409, USA.

* email: myrina.boulais@gmail.com

Supplementary figure S1



Supplementary Figure 1. Histological description of the different gametogenesis stages of the Eastern oyster observed at the end of the four pH level conditioning. (a) gonad illustrating the dormant phase, observed in the pH 6.7 condition. Gonads of (b) a female and (c) a male illustrating early development (Stage I) observed at pH 7.1 or 6.7. A female (d) and a male (e) gonad illustrating late development (Stage II) observed at pH 7.9, 7.5, and 7.1. A female (f) and a male (g) ripe gonad (Stage III) observed at pH 7.9, and 7.5. Ct: conjunctive tissue, Oog: oogonia, Vooc: vitellogenic oocyte, Mooc: mature oocyte, Spg: spermatogonia, Spc: spermatocytes, Spt: spermatids, Spz: spermatozoa. Scale bar = 50 µm.

Supplementary Table S1, S2, and S3

Supplementary Table 1. Summary of interannual pH variability in East Coast, USA estuaries. NA, Not Available.

Type of measurement	pH	Site	Reference
Average (minimum)	7.2 - 7.8 (6.9 - 7.6) depending on sites, in summer	Charleston Harbor, SC	1
ΔpH	0.3 minimum in pH in the summer	Pivers Island Coastal Observatory, Beaufort, NC 34.7181° N, 76.6707 ° W	2
Average (minimum)	8.2 (8.1) at the end of winter 7.6 (7.2) in late summer	Flax Pond, Long Island, NY 40°57.78' N, 73°8.22' W	3
Average (minimum)	NA (7.9) in winter <7.9 (<7.0) in summer	Western Long Island Sound, NY-CT 41.11° N, 72.86° W	4

Supplementary Table 2. Water chemistry parameters during the 5-week oyster conditioning (4 pH levels) and fertilization (2 pH levels) experiments (mean \pm SD). NBS, National Bureau of Standards; $p\text{CO}_2$, partial pressure of CO_2 ; DIC, total dissolved inorganic carbon; SW, seawater; Ω , saturation state.

Parameter	Oyster conditioning experiment			
pH_{NBS}	7.90 ± 0.06	7.48 ± 0.03	7.12 ± 0.01	6.71 ± 0.02
$p\text{CO}_2$ (μatm)	784 ± 89	2260 ± 68	5584 ± 277	18480 ± 943
DIC ($\mu\text{mol kg}^{-1}$ SW)	2048 ± 68	2215 ± 83	2476 ± 114	3499 ± 78
CO_3^{2-} ($\mu\text{mol kg}^{-1}$ SW)	109 ± 15	45 ± 5	21 ± 1	11 ± 0.32
HCO_3^- ($\mu\text{mol kg}^{-1}$ SW)	1915 ± 57	2099 ± 80	2280 ± 106	2911 ± 57
Ω_{Calcite}	2.59 ± 0.37	1.07 ± 0.11	0.51 ± 0.03	0.25 ± 0.01
$\Omega_{\text{Aragonite}}$	1.69 ± 0.24	0.70 ± 0.08	0.33 ± 0.02	0.16 ± 0.01
Total alkalinity ($\mu\text{mol kg}^{-1}$ SW)	2185 ± 87	2211 ± 90	2332 ± 108	2936 ± 58

Supplementary Table 3. Water chemistry parameters (mean \pm SD) during the fertilization and larval development experiments (2 pH levels). NBS, National Bureau of Standards; $p\text{CO}_2$, partial pressure of CO_2 ; DIC, total dissolved inorganic carbon; SW, seawater; Ω , saturation state.

Parameter	Fertilization experiment	Larval development experiment	
pH_{NBS}	7.90 ± 0.04	7.49 ± 0.02	7.90 ± 0.03
$p\text{CO}_2$ (μatm)	803 ± 70	2239 ± 98	798 ± 92
DIC ($\mu\text{mol kg}^{-1}$ SW)	2094 ± 18	2272 ± 12	2070 ± 73
CO_3^{2-} ($\mu\text{mol kg}^{-1}$ SW)	108 ± 9	48 ± 3	108 ± 6
HCO_3^- ($\mu\text{mol kg}^{-1}$ SW)	1961 ± 11	2154 ± 11	1937 ± 75
Ω_{Calcite}	2.56 ± 0.21	1.15 ± 0.08	2.58 ± 0.13
$\Omega_{\text{Aragonite}}$	1.67 ± 0.13	0.75 ± 0.05	1.68 ± 0.09
Total alkalinity ($\mu\text{mol kg}^{-1}$ SW)	2228 ± 33	2273 ± 2	2205 ± 60
			2244 ± 43

Chemistry parameter values for 7.9 and 7.5 conditions were in the range of those reported in previous studies conducted on the Eastern oyster on the East coast of the USA^{5,6}.

Supplementary references

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